SEW EURODRIVE

MOVIDRIVE® MDX61B...-5_3-4-08 with SL2 Synchronous Linear Motors

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Operating Instructions

SEW
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1 Important Notes

Safety and warning notes

Always follow the safety and warning notes in this publication!

Electrical hazard
Possible consequences: Severe or fatal injuries.

Hazard
Possible consequences: Severe or fatal injuries.

Hazardous situation
Possible consequences: Slight or minor injuries.

Harmful situation
Possible consequences: Damage to the unit and the environment.

Tips and useful information.

You must observe the following operating instructions as a prerequisite for fault-free operation and fulfillment of any right to claim under warranty. Consequently, read the operating instructions before you start operating the drive.

- MOVIDRIVE® MDX61B...-5_3-4-08 operating instructions
- MOVIDRIVE® MDX60B/61B operating instructions
- SL2 synchronous linear motors operating instructions

The operating instructions contain important information about servicing and should be kept close to the unit. You can download up-to-date documentation from the SEW homepage (http://www.sew-eurodrive.de).

Additional documentation

- For information on project planning as well as technical data and dimension sheets, refer to the "SL2 Synchronous Linear Motors" catalog.
- MOVIDRIVE® MDX60/61B system manual

Designated use

The MOVIDRIVE® MDX61B...5_3-4-08 drive inverters are designed for use with SL2 synchronous linear motors. Motor utilization other than that specified and areas of application other than industrial and commercial systems can only be used after consultation with SEW-EURODRIVE.

Do not start up the unit (take it into operation in the designated fashion) until you have established that the machine complies with the EMC Directive 89/336/EEC and that the conformity of the end product has been determined in accordance with the Machinery Directive 98/37/EEC (with reference to EN 60204).

Operational environment

The following uses are prohibited unless the units are expressly designed for the purpose:

- Use in potentially explosive areas.
- Use in areas exposed to harmful oils, acids, gases, vapors, dust, radiation. Please contact SEW-EURODRIVE if you have any questions on the environmental conditions.
- Use in non-stationary applications that are subject to mechanical vibration and shock loads in excess of the requirements in EN 61800.

Safety functions

The MOVIDRIVE® MDX61B...5_3-4-08 drive inverters and SL2 linear motors may not execute any safety functions without higher-level safety systems.

Use higher-level safety systems to ensure protection of equipment and personnel.

Qualified personnel

SL2 linear motors represent a potential hazard for persons and property. Consequently, assembly, installation, startup and service work may only be performed by trained personnel who are aware of the potential hazards.

The personnel must be appropriately qualified for the task in hand and must be familiar with the assembly, installation, startup and operation of the product. The personnel must read the operating instructions, in particular the safety notes section, carefully and ensure that they understand and comply with them.

Liability for defects

Incorrect handling or undertaking any action that is not specified in the operating instructions could impair the properties of the product. In this case, you lose any right to claim under limited warranty against SEW-EURODRIVE GmbH & Co KG.

Product names and trademarks

The brands and product names contained within the operating instructions are trademarks or registered trademarks of the titleholders.

Waste disposal

Dispose of materials separately in accordance with the current regulations in force, for example:

- Electronics scrap (circuit boards)
- Plastic (housing)
- Sheet metal
- Copper

etc.

2 Safety Notes

Comply with the safety notes in the following operating instructions:

- SL2 Synchronous Linear Motors
- MOVIDRIVE® MDX60B/61B

3 Unit Design

3.1 System overview

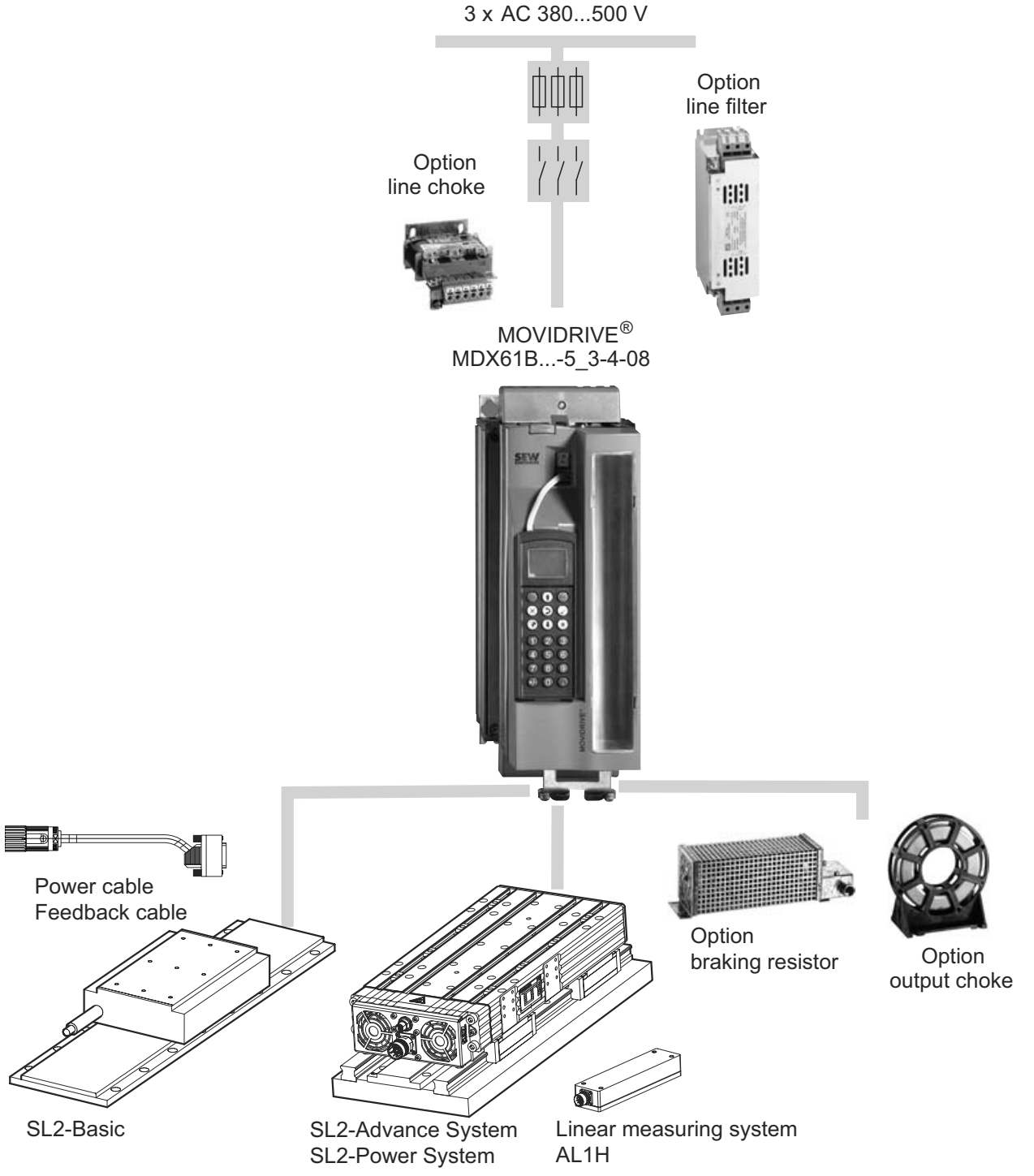

Figure 1: System overview: MOVIDRIVE® MDX61B...-5_3-4-08 with SL2 synchronous linear motors

3.2 SL2 product designs

SEW-EURODRIVE offers **three** product designs for SL2 linear motors:

SL2-Basic	Motor package and secondaries
SL2-Advance System	Motor package integrated in motor cooling unit and secondary. Prepared for installation of linear guides and the linear encoder.
SL2-Power System	Motor package integrated in motor cooling unit with forced cooling fan and secondaries. Prepared for installation of linear guides and the linear encoder.

SL2-Basic

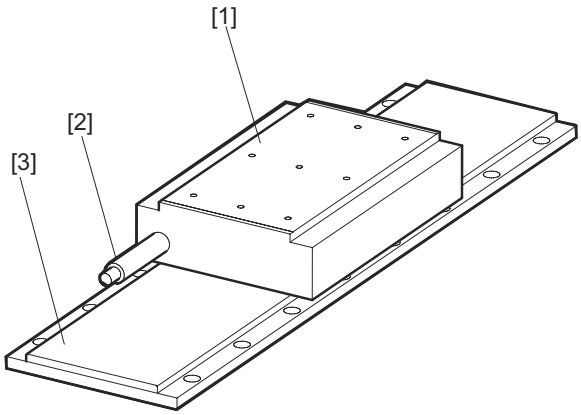

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Figure 2: SL2-Basic synchronous linear motor

[1] Primary
[2] Electrical connection in form of a cable extension
[3] Secondary with permanent magnets

SL2-Advance System / SL2-Power System

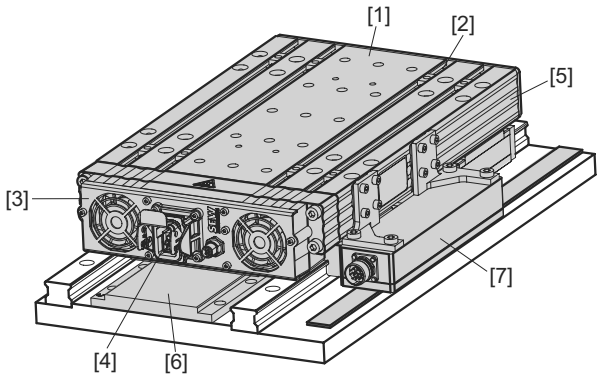

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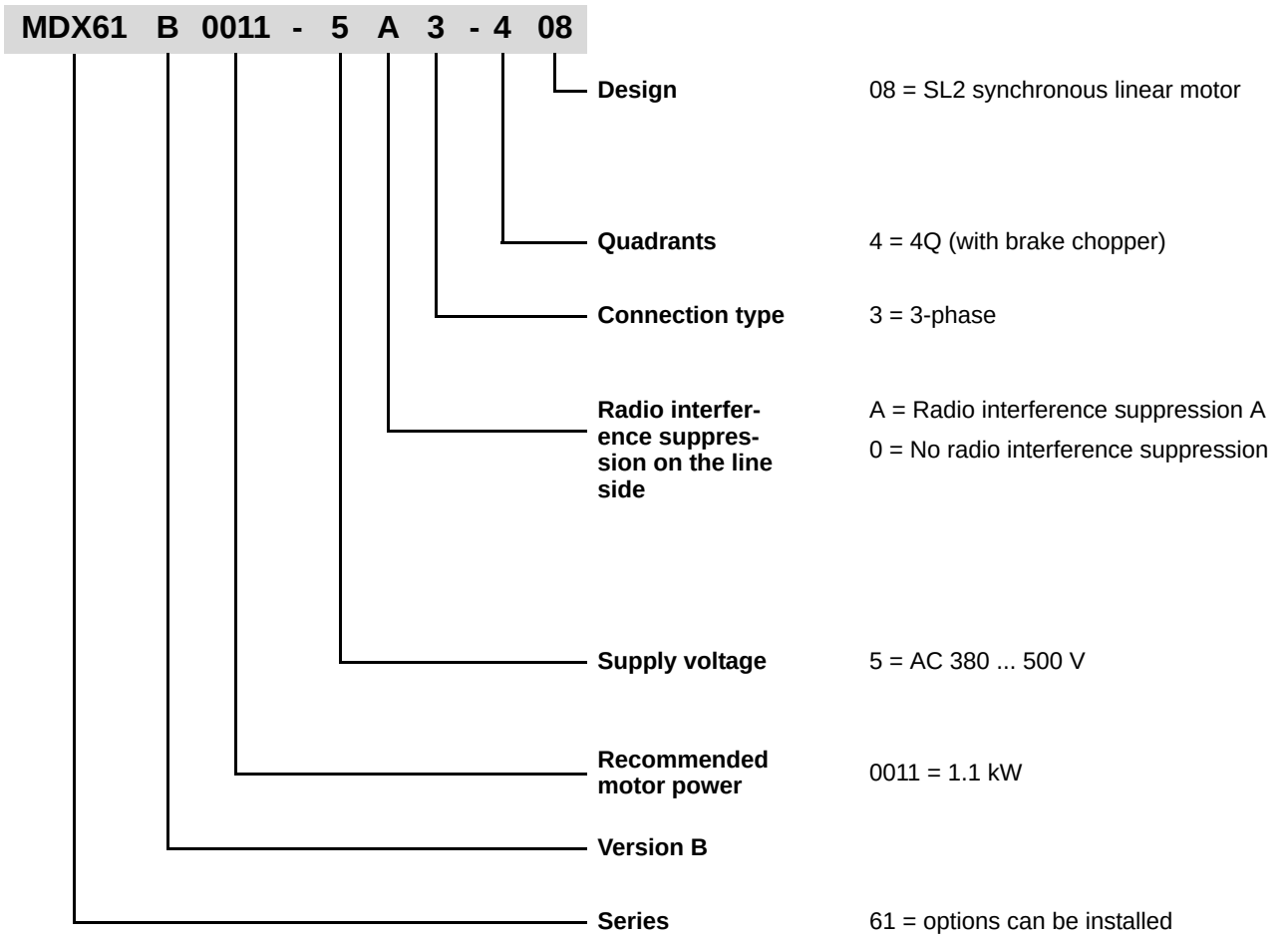
Figure 3: SL2-Advance System and SL2-Power System synchronous linear motor

[1] Optional motor cooling unit
]2[Prepared slots as retaining system for customer setup
[3] Forced cooling fan of optional motor cooling unit
[4] Electrical plug connector
[5] Primary (not visible) installed in motor cooling unit
[6] Secondary
[7] Linear measuring system

3.3 MOVIDRIVE® MDX61B...-08 part numbers

The SL2 synchronous linear motors are offered together with the MOVIDRIVE® MDX61B...-5_3-4-08 drive inverters from SEW-EURODRIVE.

MOVIDRIVE® MDX61B...-08 unit designation


MDX61 B 0011 - 5 A 3 - 4 08
Design
08 = SL2 synchronous linear motor
Quadrants
4 = 4Q (with brake chopper)
Connection type
3 = 3-phase
Radio interference suppression on the line side
A = Radio interference suppression A
0 = No radio interference suppression
Supply voltage
5 = AC 380 ... 500 V
Recommended motor power
0011 = 1.1 kW
Version B
Series
61 = options can be installed

- You must always use the HIPERFACE® encoder card type DEH11B (part number 824 310 7) to connect the AL1H motor encoder. Refer to the MOVIDRIVE® MDX60/61B system manual for more information.
- The firmware supports the internal drive spline calculation for 20 curve points (*_GetSys(SS_SPLINE, var)*. This feature enables a format-independent cam disk to be calculated in the drive using curve points, without having to transfer a complete curve point table from the higher-level controller.
- The MOVIDRIVE® MDX61B...-08 units have all the properties listed for the MOVIDRIVE® MDX60B/61B...-0T series (→ MOVIDRIVE® MDX60B/61B system manual).

Part numbers

MOVIDRIVE® MDX61B	Part number
MDX61B0005-5A3-4-08	828 625 6
MDX61B0008-5A3-4-08	828 626 4
MDX61B0011-5A3-4-08	828 627 2
MDX61B0014-5A3-4-08	828 628 0
MDX61B0015-5A3-4-08	828 629 9
MDX61B0022-5A3-4-08	828 630 2
MDX61B0030-5A3-4-08	828 631 0
MDX61B0040-5A3-4-08	828 632 9
MDX61B0055-5A3-4-08	828 633 7
MDX61B0075-5A3-4-08	828 634 5
MDX61B0110-5A3-4-08	828 635 3
MDX61B0150-503-4-08	828 636 1
MDX61B0220-503-4-08	828 638 8
MDX61B0300-503-4-08	828 639 6
MDX61B0370-503-4-08	828 641 8
MDX61B0450-503-4-08	828 642 6
MDX61B0550-503-4-08	828 643 4
MDX61B0750-503-4-08	828 644 2
MDX61B0900-503-4-08	828 645 0
MDX61B1100-503-4-08	828 646 9
MDX61B1320-503-4-08	828 647 7

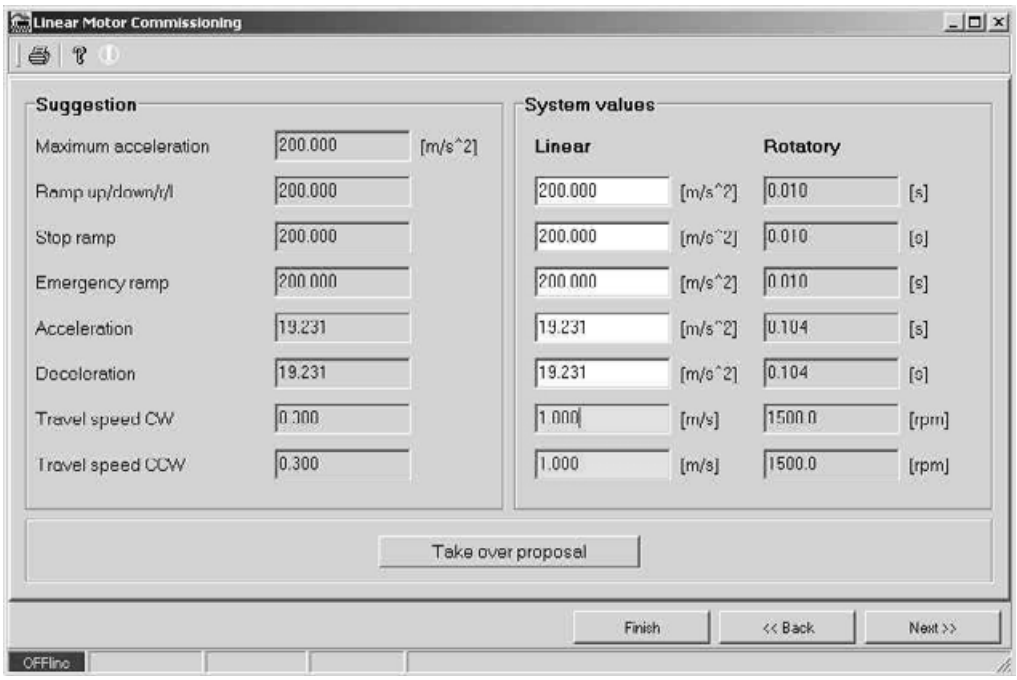
4 Parameters

4.1 Parameter settings

All parameters of the standard MOVIDRIVE® MDX60B/61B units are available. The following rotary values must be converted to linear values:

- Ramps
- Speeds

The conversions are dependent on the signal periods of the connected encoder. To prevent rounding errors, enter the values in the startup screen (→ following figure).



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5 Electrical Installation

You must comply with the safety notes in the operating instructions for the inverter during installation.

5.1 Safety notes

EMC measures

SL2 synchronous linear motors and MOVIDRIVE® MDX61B...-5_3-4-08 from SEW-EURODRIVE are components designed for installation in machinery and systems. The designer of the machine or system is responsible for complying with the EMC Directive 89/336/EEC. For more detailed information on this topic, refer to the SEW publications:

"Drive Engineering Practical Implementation Volume 7, Project Planning for Drives" and "Drive Engineering Practical Implementation Volume 9, EMC in Drive Engineering".

Encoder connection

Observe the following instructions when connecting an encoder:

- If another encoder is connected to option DEH11B at X14, in addition to the AL1H Hiperface® encoder at X15, you must connect an external voltage to one of the encoders (please note: The maximum total current carrying capacity of the DC 12 V supply at X14/X15 is 650 mA).
- Use only shielded cables with twisted pair cores.
- Connect the shield to the PE potential on both ends over a large surface area.
- Route the signal cables separately from the power cables or brake cables (min. distance 200 mm).

TF evaluation

When SL2 synchronous linear motors are combined with MOVIDRIVE® MDX61B...-5_3-4-08 units, the TF can be connected and evaluated directly on the inverter.

Full motor protection is only ensured when a TF is installed. If you use a KTY temperature sensor (KTY84...140), please contact SEW-EURODRIVE.

Design of the AL1H feedback cable for MOVIDRIVE® MDX61B

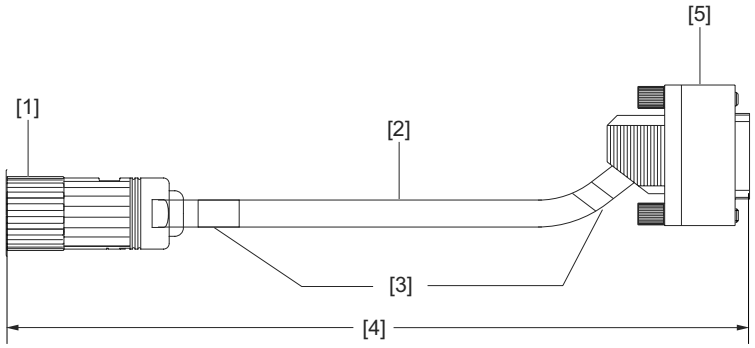

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Figure 4: Design of the AL1H feedback cable

[1] Connector: Intercontec ASTA
[2] Printed on connector: SEW-EURODRIVE
[3] Nameplate
[4] Cable length ≤ 10 m: +200 mm tolerance
Cable length ≥ 10 m: +2 % tolerance
Permitted cable length according to the technical documents
[5] Sub D plug

A 12-pin EMC signal plug connector with socket contacts from Intercontec is used to connect the encoder system. The shield is connected in the connector housing according to the EMC standards. All plug connectors seal the plug on the cable end with a lamellar seal.

Prefabricated cables for inverter end

A commercial sub-D EMC connector with pin contacts is used on the inverter end. A 15-pin connector to fit the inverter is used.

Hybrid cables

The outer cable sheath on the motor and inverter end bears a nameplate with part number and logo of the prefabricated cable manufacturer. The ordered length and permitted tolerance are interrelated as follows:

- Cable length ≤ 10 m: 200 mm tolerance
- Cable length ≥ 10 m: Tolerance +2 %

When configuring the maximum cable length, refer to the data specified in the inverter system manual.

Cable for AL1H encoders

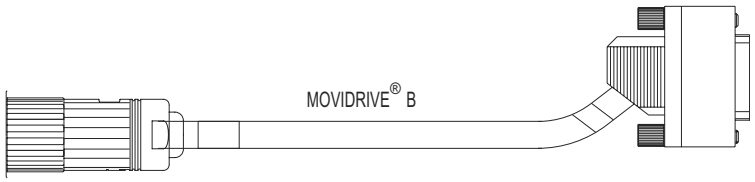

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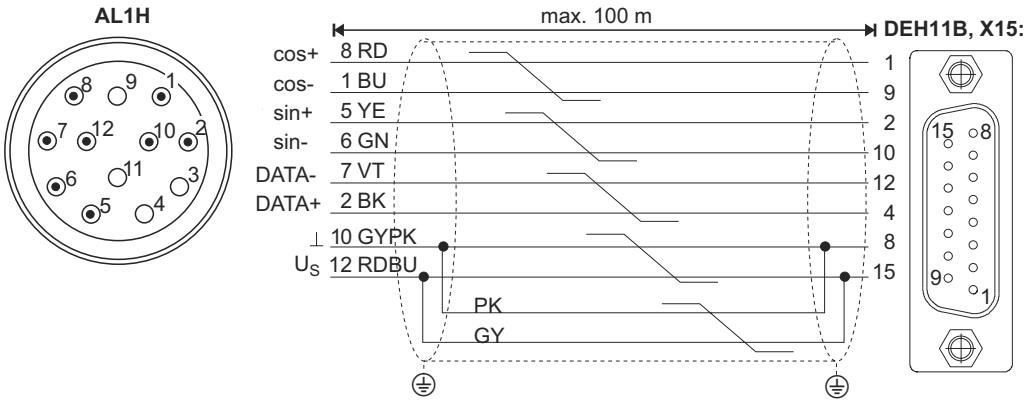
Figure 5: Connection cable for AL1H encoders

Type	Installation	Part number
SL2	Cable carrier installation (MOVIDRIVE® B)	595 151 8

Connecting the AL1H Hiperface® encoder to DEH11B

The following illustration shows how the AL1H Hiperface® encoder (view onto encoder plug) is connected to the DEH11B option (view onto unit socket).



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6 Startup

6.1 Prerequisites for startup

You must comply with the safety notes in section 2.

Before startup, make sure that:

- The primary moves along the entire travel distance easily, without collisions and free from mechanical contact between the primary and secondary
- All connections have been made properly
- All protection devices have been installed correctly
- All motor protection devices are active
- The brake works correctly in hoists
- You have a MOVIDRIVE® MDX61B....-5_3-4-08 unit
- There are no other sources of danger present
- The MOVITOOLS® startup software is installed on your PC.

6.2 Commutation travel process

Contrary to rotating systems, there is initially no mechanical connection between the encoder system, primary and secondary in SL2 linear motors.

This connection must be made during startup. The SL2 synchronous linear motor can then be controlled directly by the inverter.

This process is referred to as commutation search or commutation travel.

This takes place

- once after "encoder adjustment" for absolute distance measuring systems
- every time the unit is turned on or reset in case of incremental distance measuring systems.

Commutation travel process

1. The SL2 linear motor moves to a random position. This can be a distance of between 0 mm to max. 16 mm in either direction from the start position. The SL2 linear motor stops here for approximately one second.

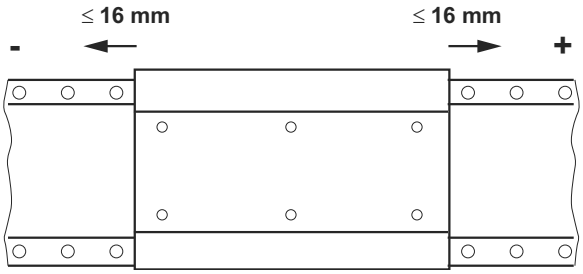

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Figure 6: First cycle of the commutation travel

2. The SL2 linear motor is moved by 32 mm in the positive direction. It stops here for about one second.

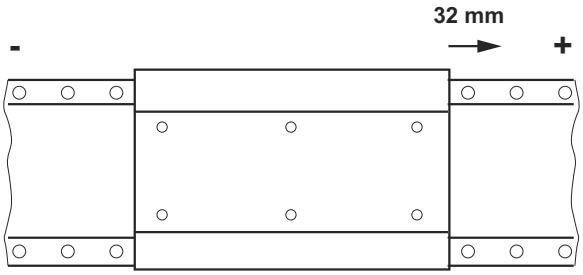

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Figure 7: Second cycle of the commutation travel

3. The SL2 linear motor is moved by 32 mm in the negative direction. It stops here for about one second.

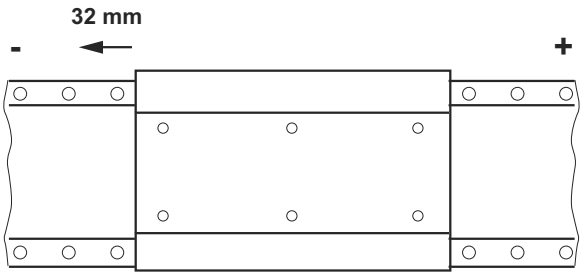

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Figure 8: Third cycle of the commutation travel

The inverter repeats the commutation process if the SL2 linear motor hits a hardware limit switch during commutation travel. The SL2 linear motor then moves to a new start position, 32 mm away from the limit switch. The cycle restarts.

You will then hear a quiet cracking noise and the inverter switches from controlled to automatic mode. Variable H458 is reset to "1."

6.3 Startup procedure

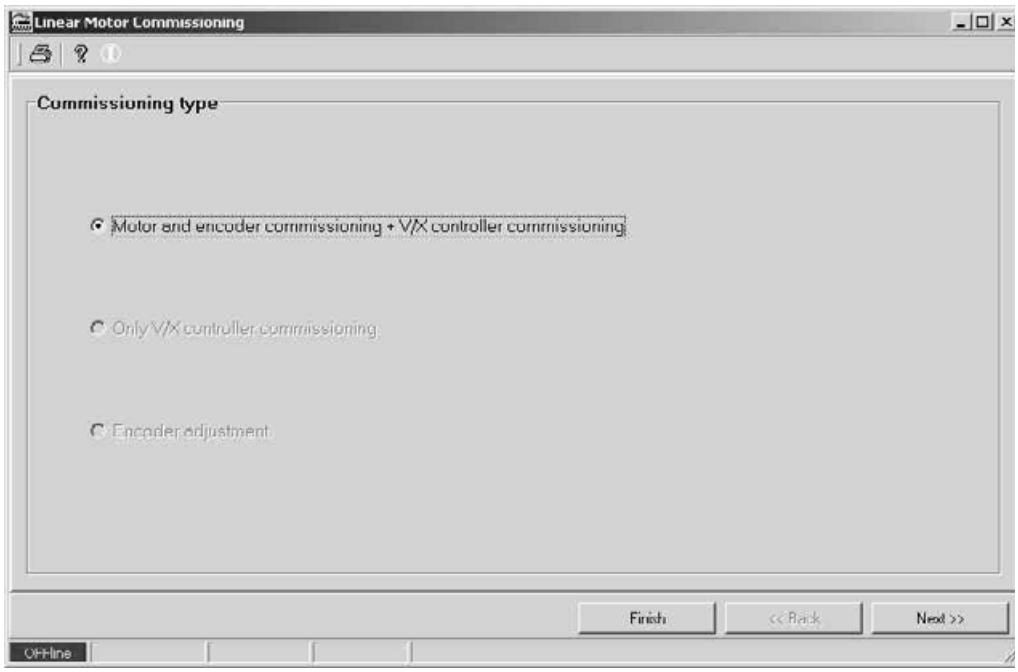
The startup procedure is divided into the following sections:

- Take the linear motor into operation
- Take the V/X controller into operation
- Check the encoder evaluation
- Check the hardware limit switches
- Activate drive limits for initial startup
- Perform commutation travel (with absolute or incremental encoder)
- Optimize axle

Taking the linear motor into operation

Make sure that the inverter is in controller inhibit or 24 V mode.

In MOVITOOLS® Shell, call up the menu item [Startup] / [Linear motor] (→ following screenshot).



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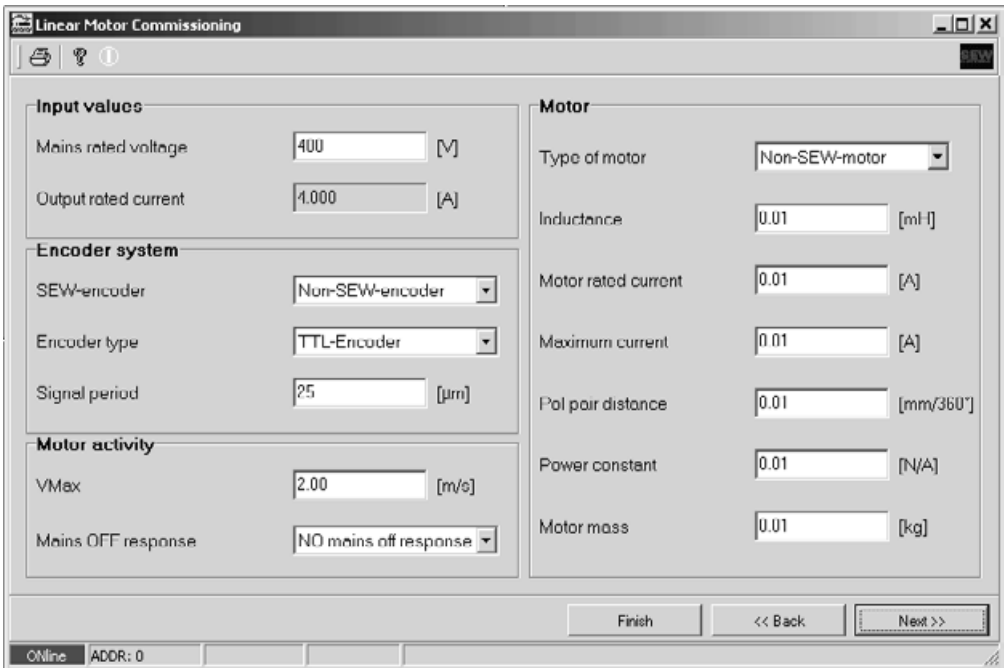
Select the option "Motor and encoder commissioning + V/X controller commissioning." Click "Next" to continue.

Enter the date of the connected linear motor and the encoder system in the following window.



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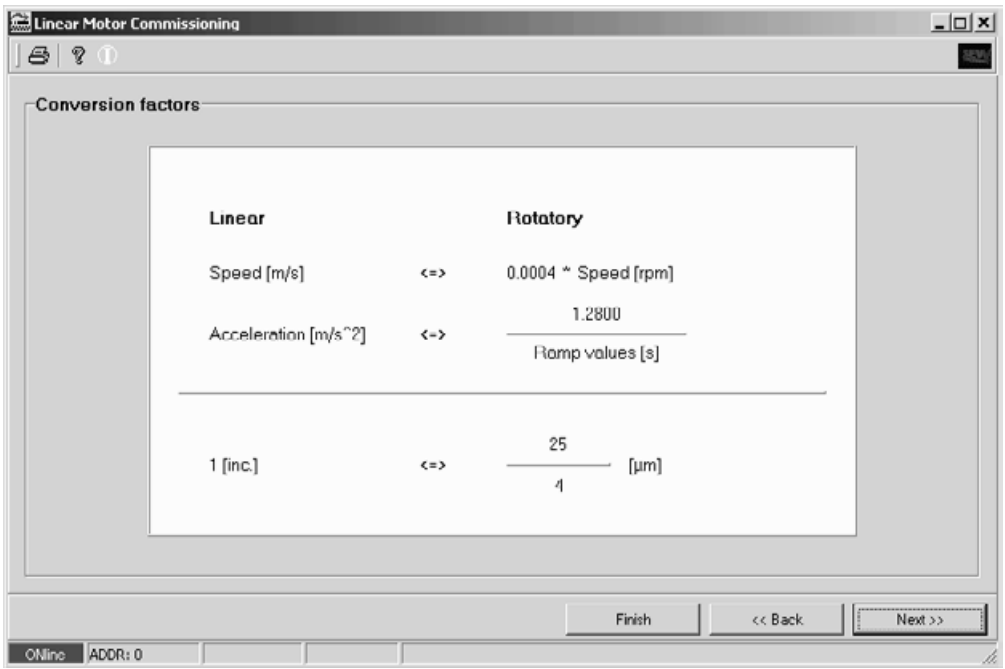
Click "Next" when you have entered all the required data. The "Conversion factors" window is displayed (→ following screenshot).



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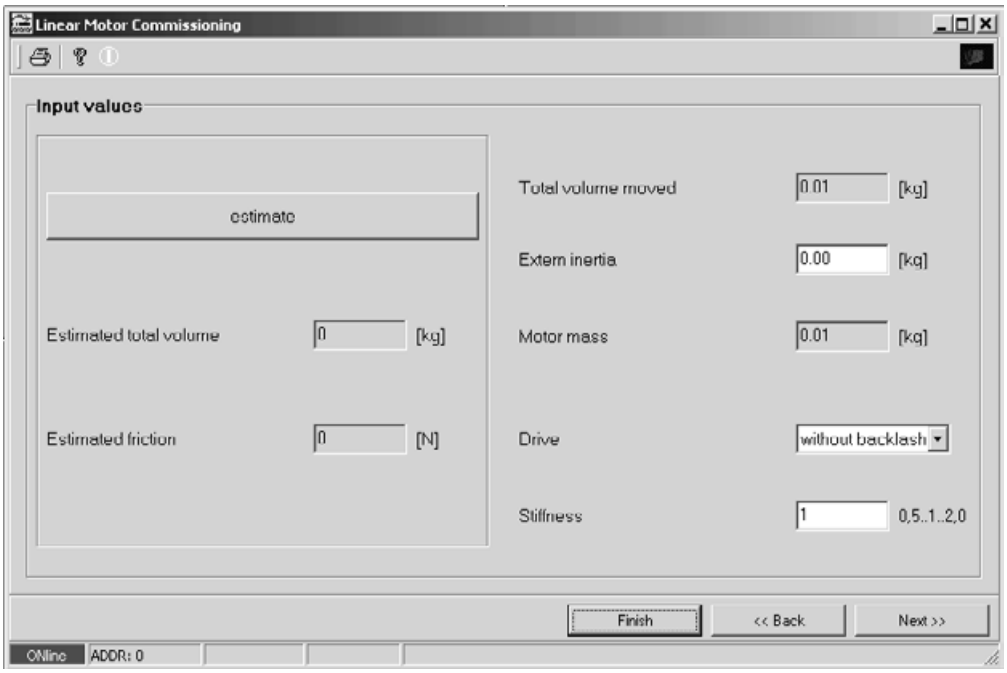
The linear ↔ rotary conversion factors are displayed. Click "Next" to continue. To transfer the data to the inverter, click the "Download" button in the following window. The startup screen for the V/X controller is then started automatically (→ following screenshot).

Taking the V/X controller into operation



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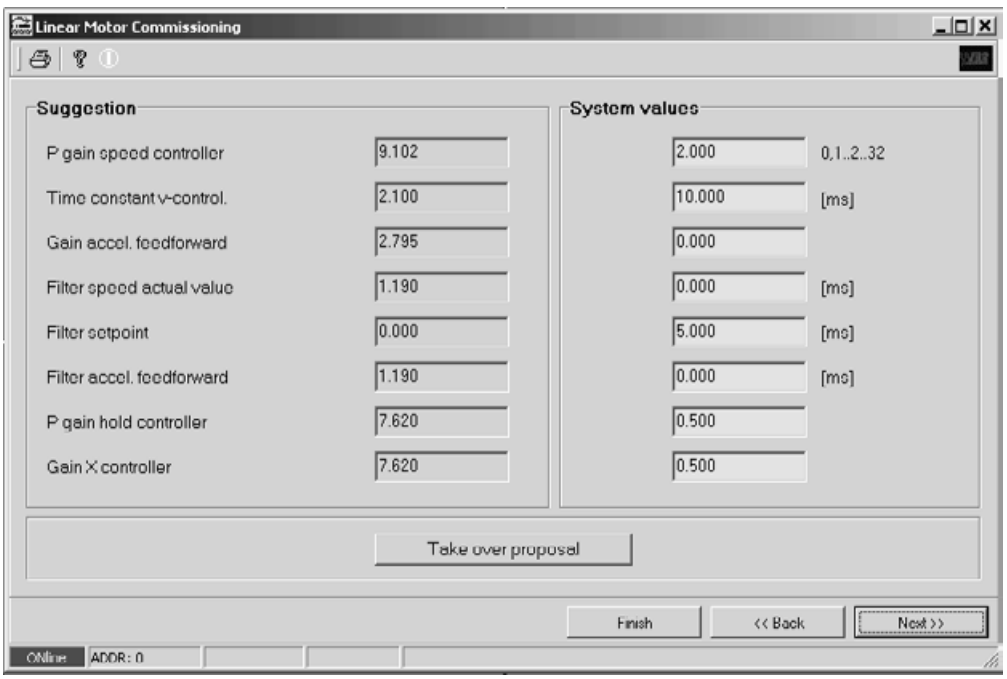
In the "Total volume moved" input field, enter the weight of the volume to be moved. In the "Drive" selection field, select whether the drive is with or without backlash. In the "Stiffness" input field, enter the stiffness of the drive (starting with the value "1"). This procedure can be repeated once startup has been performed and the encoder and limit switch checked to optimize the settings (→ section "Optimizing the axle"). Click "Next" to continue.

The default controller parameters are displayed (→ following screenshot).



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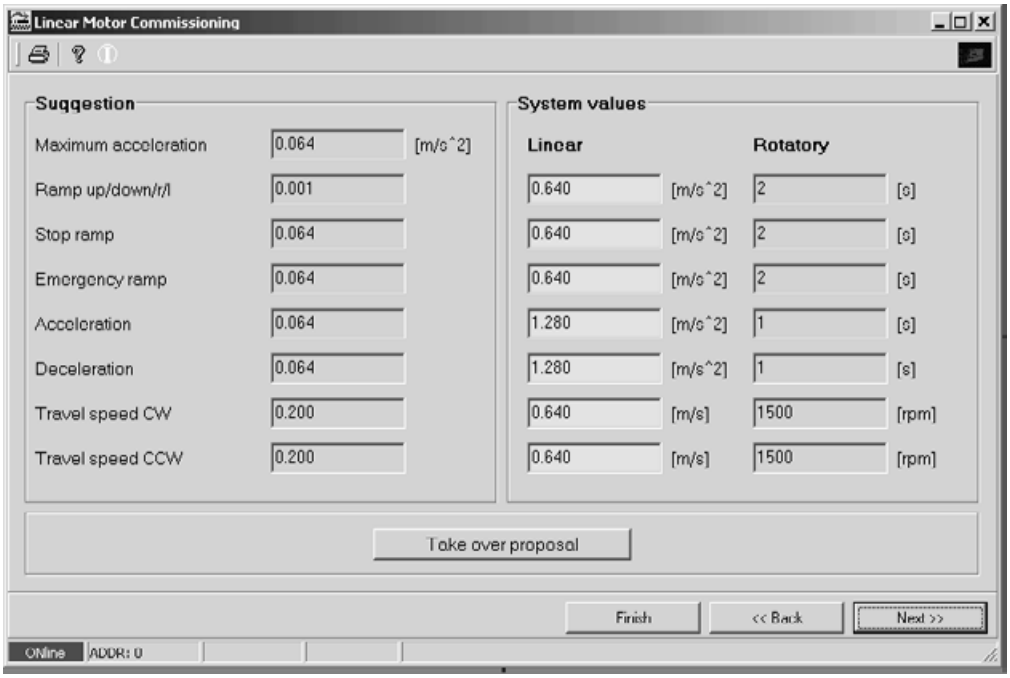
Click the "Take over proposal" button. The suggested values are transferred to the system values. Click "Next" to continue.

The suggested travel parameters (left) and the system values (linear and rotary values) are displayed (→ following screenshot).



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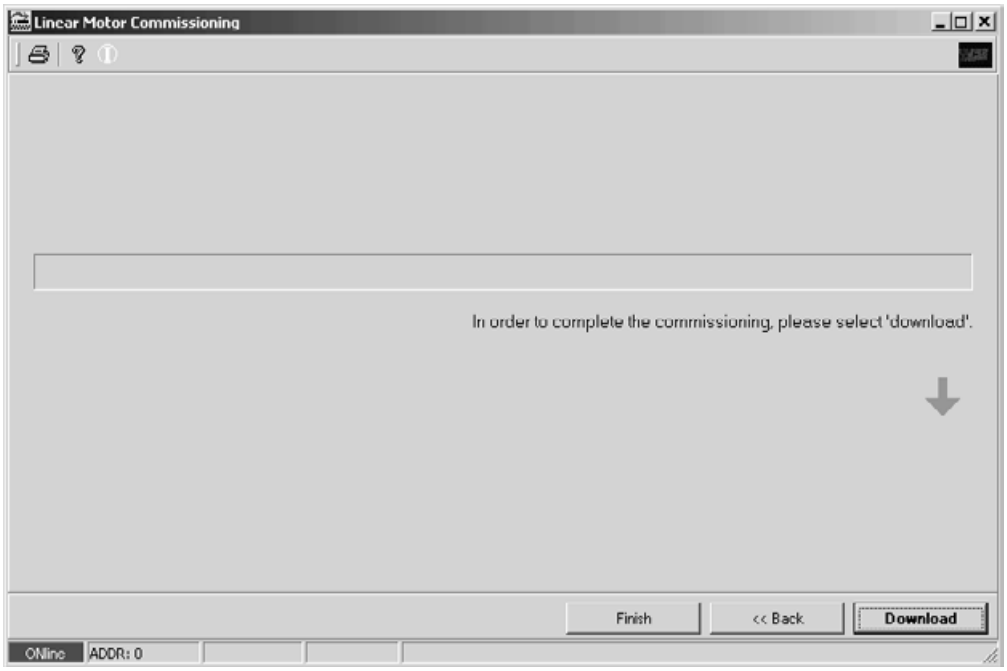
If you want to accept the proposals, click the "Take over proposal" button. You also have the option to adjust the values.

Click "Next" to continue.



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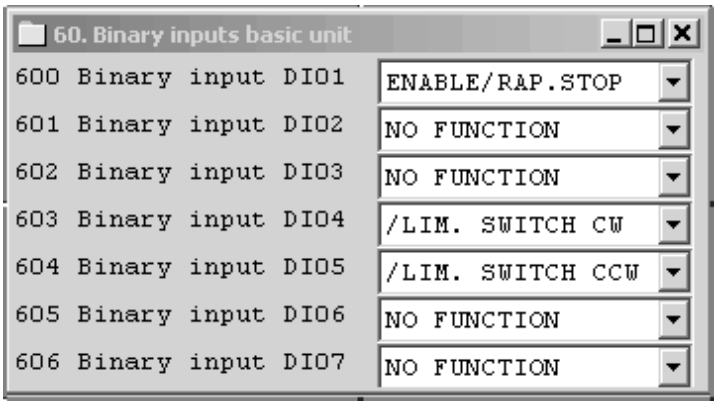
To complete startup and load the data into the inverter, click the "Download" button.

Checking the encoder evaluation

Move the primary in one direction manually and observe parameter *P003 Actual position* in MOVITOOLS®. Determine the positive direction of movement. Then slide the SL2 linear motor once over the entire travel distance to check if the encoder works correctly in all areas.

Checking the hardware limit switches

Set the parameters for the hardware limit switches (→ following screenshot). Check the function of the limit switches by moving the primary manually to the limit switches.



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Activating drive limits for initial startup

For initial startup, limit the maximum speed in parameter *P302 Max. speed 1* and the maximum force in parameter *P304 Torque limit* so that the motor cannot develop its full force and speed in case of an uncontrolled axle movement.

Do not limit the maximum force in parameter *P303 Current limit 1* or the maximum speed in the first dialog box of the linear motor startup as this affects internal system values.

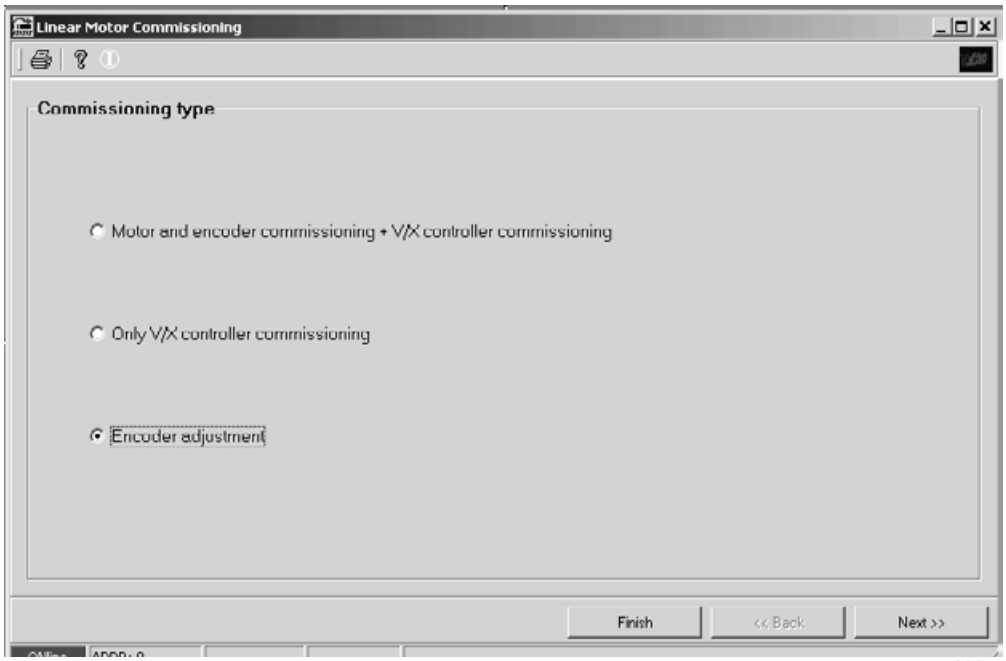
Commutation travel

Please read the following notes carefully:

- **Always set one binary input to the "Enable" signal.**
- **Never activate an enable signal on the inverter during commutation travel.**
- **Make sure that the motor can be moved by the length of a pole pitch to the right.**

- **Motor with Hiperface® encoder**

  If the **motor is equipped with a Hiperface® encoder**, you must determine the relative position of the motor in relation to the encoder once. To do so, choose the option "Encoder adjustment"(→ following screenshot) during startup of the linear motor.



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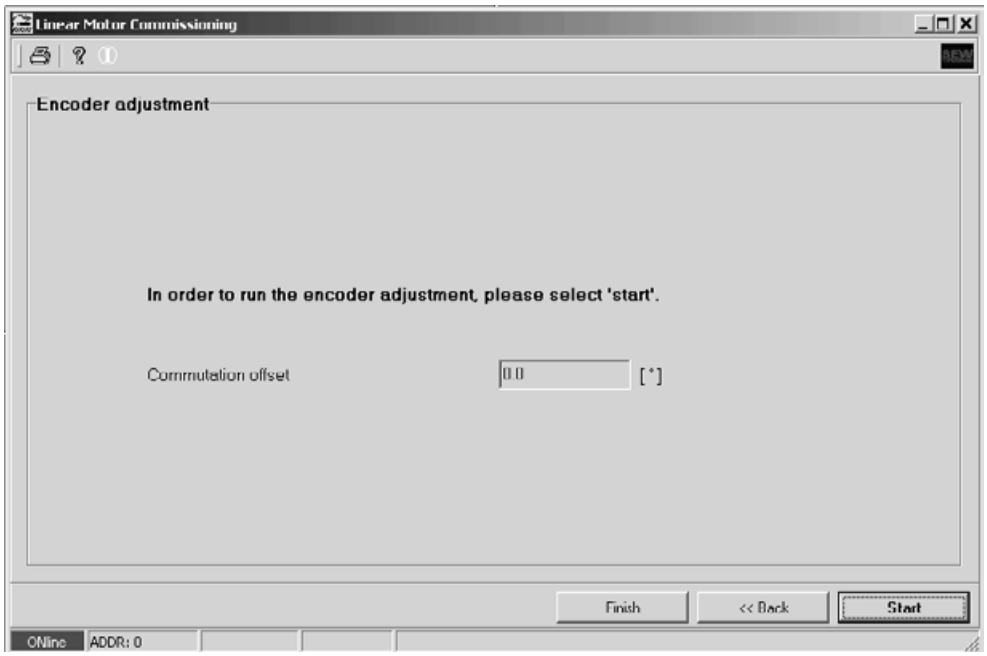
Click "Next" to continue. The "Encoder adjustment" window is displayed (→ following screenshot).



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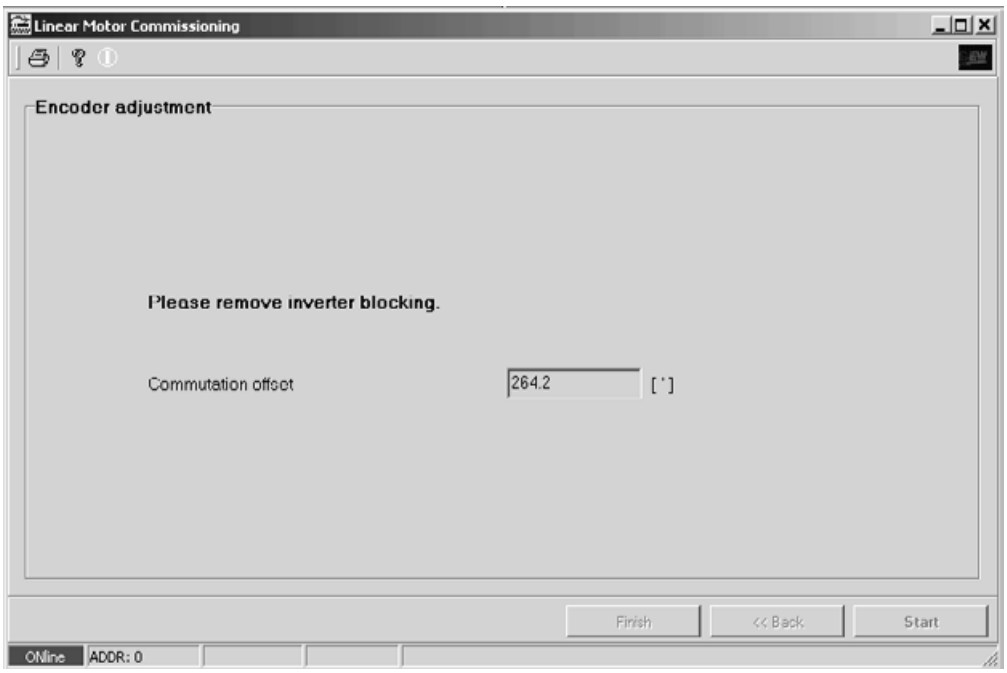
Click the "Start" button.



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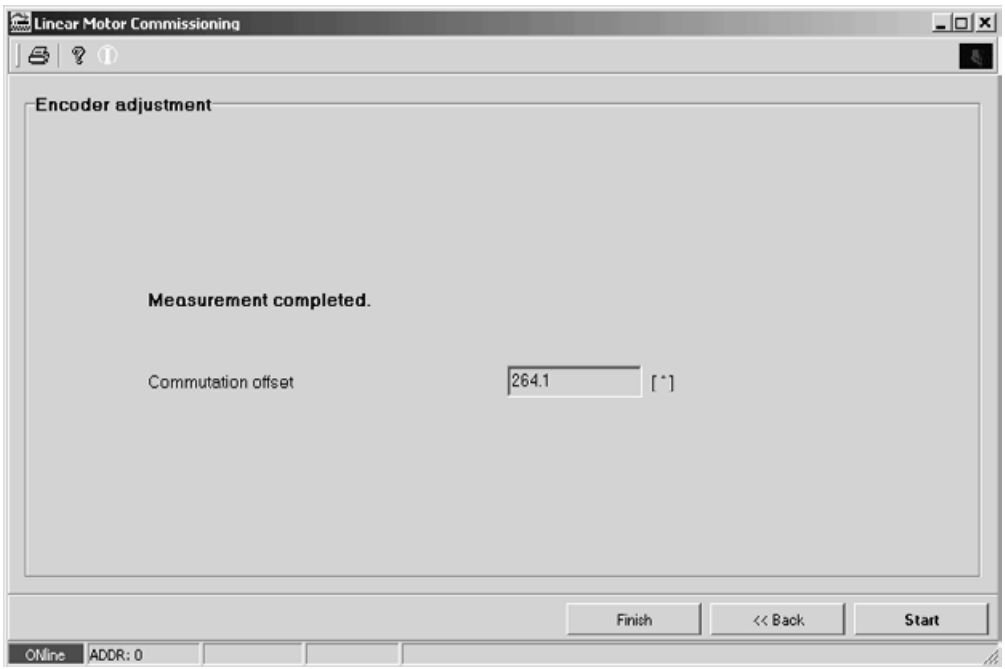
Deactivate the controller inhibit (DI00=1). The encoder adjustment process starts. Once the encoder adjustment is complete, the following window is displayed.



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The calibration process is complete; the encoder is adjusted. Once commutation travel is complete, the inverter sets the IPOS$^{plus®}$ variable H458 to "1." This value will be evaluated later in the IPOS$^{plus®}$ program or in the PLC to permit the inverter enable.

- **Motor with incremental encoder**

  Please read the following notes carefully:

  – Make sure that the motor can be moved by the length of a pole pitch to the right each time the power supply is switched on or the inverter is reset.
  – Only enable the drive when the IPOS$^{plus®}$ variable H458 is set to "1."

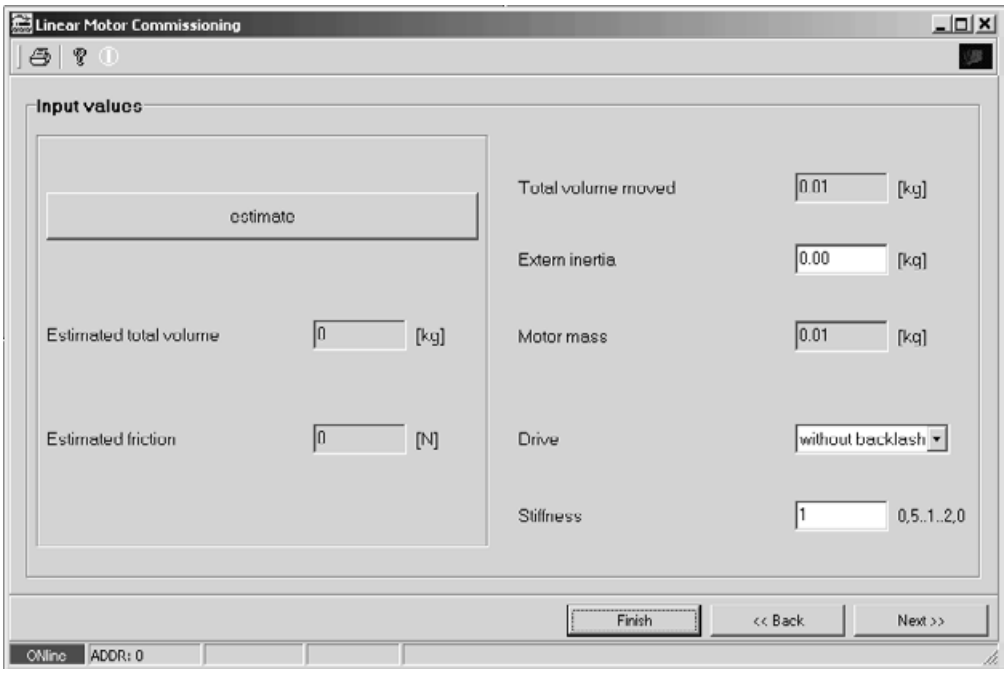
  If the **motor is equipped with an incremental encoder**, the relative position of the encoder in relation to the motor must be determined each time the power supply is switched on. Commutation travel starts automatically when the "/Controller inhibit" terminal is set to the value "1".

  Once commutation travel is complete, the inverter sets variable H458 to "1." This value will be evaluated later in the IPOS$^{plus®}$ program or in the PLC to permit the inverter enable.

Optimizing the axle

Write a short IPOS$^{plus®}$ program to move the SL2 linear motor cyclically between two positions.

Start the IPOS$^{plus®}$ program. In the linear motor startup window, choose the radio button "Only V/X controller commissioning." When the linear motor moves correctly, set the current and force limits back to their original values and optimize the drive control loop (→ section "Taking the V/X controller into operation") using the "Stiffness" input field and the "Estimate" button.



10529BEN

Figure 9: Screen for optimizing the axle using the "Estimate" button and the "Stiffness" input field

Additional settings

If you have not selected the "Encoder adjustment" radio button, an absolute encoder will behave like an incremental encoder. This means the SL2 linear motor will perform commutation travel each time the unit is turned on when the controller inhibit is removed.

If you need a different positive encoder counting direction for your linear axis, activate the reversal option for the motor rotation via parameter P350.

Remove the TF line from the inverter when the motor is at a standstill or enabled. Check whether TF monitoring responds (Error 31; TF trigger).

If the drive has an external brake, we recommend that you control it directly. Set the brake control using parameters P730 - P732.

6.4 Calculating the travel parameters

The inverter and the integrated IPOS$^{plus®}$ sequence control work internally with rotary values. During startup, the program determines conversion factors for linear values to rotary values.

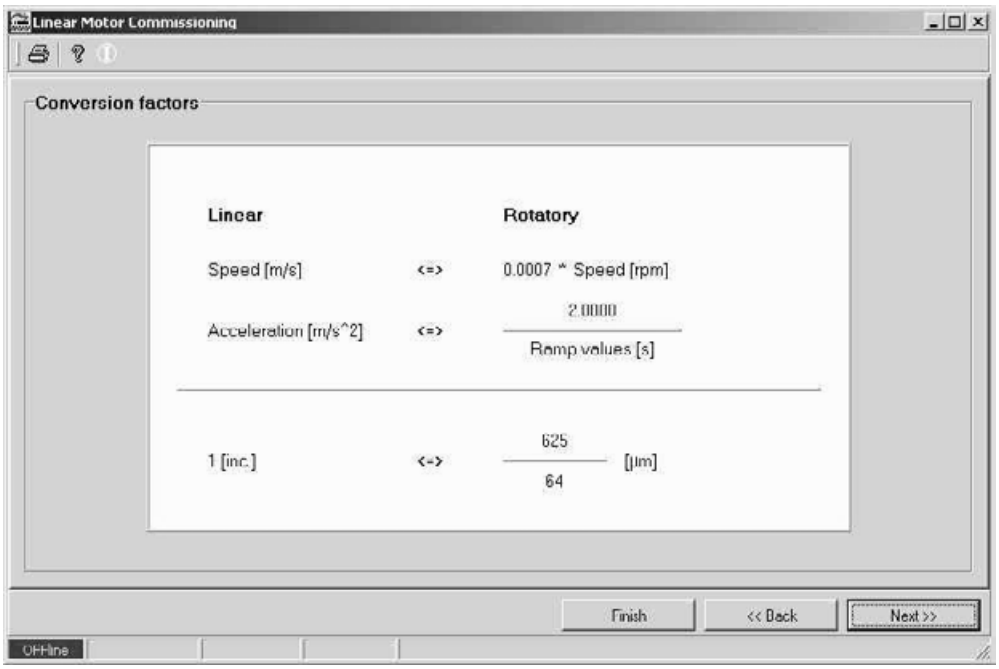


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Figure 10: Conversion factors for SL2-100M-030 with HIPERFACE® encoder displayed at the end of linear motor startup

Example:

An SL2-100M-030 synchronous linear motor with HIPERFACE® encoder is to be operated with the following travel information:

v = 1 m/s

s = 1000 mm

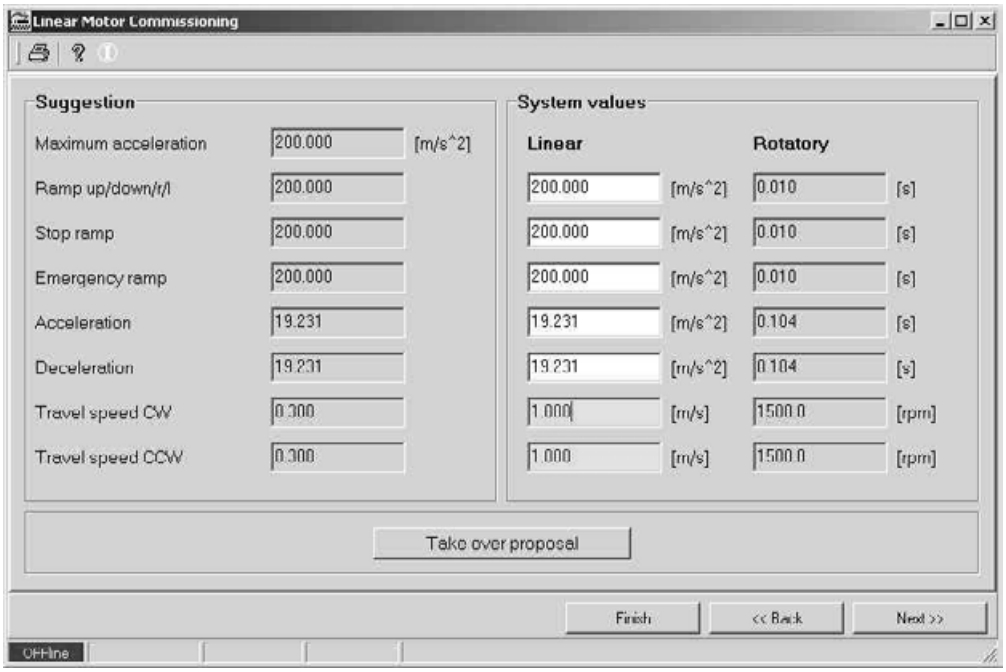
a = 5 m/s^2

Based on the conversion factors shown above, the following rotary information will be displayed in IPOS$^{plus®}$ or via fieldbus:

Speed = velocity / 0.0007 = 1428 1/min

Distance = (64 / 625) $\times$ 1000 = 102400 increments

Ramp = 2,000 / 5 = 0.4 sec.

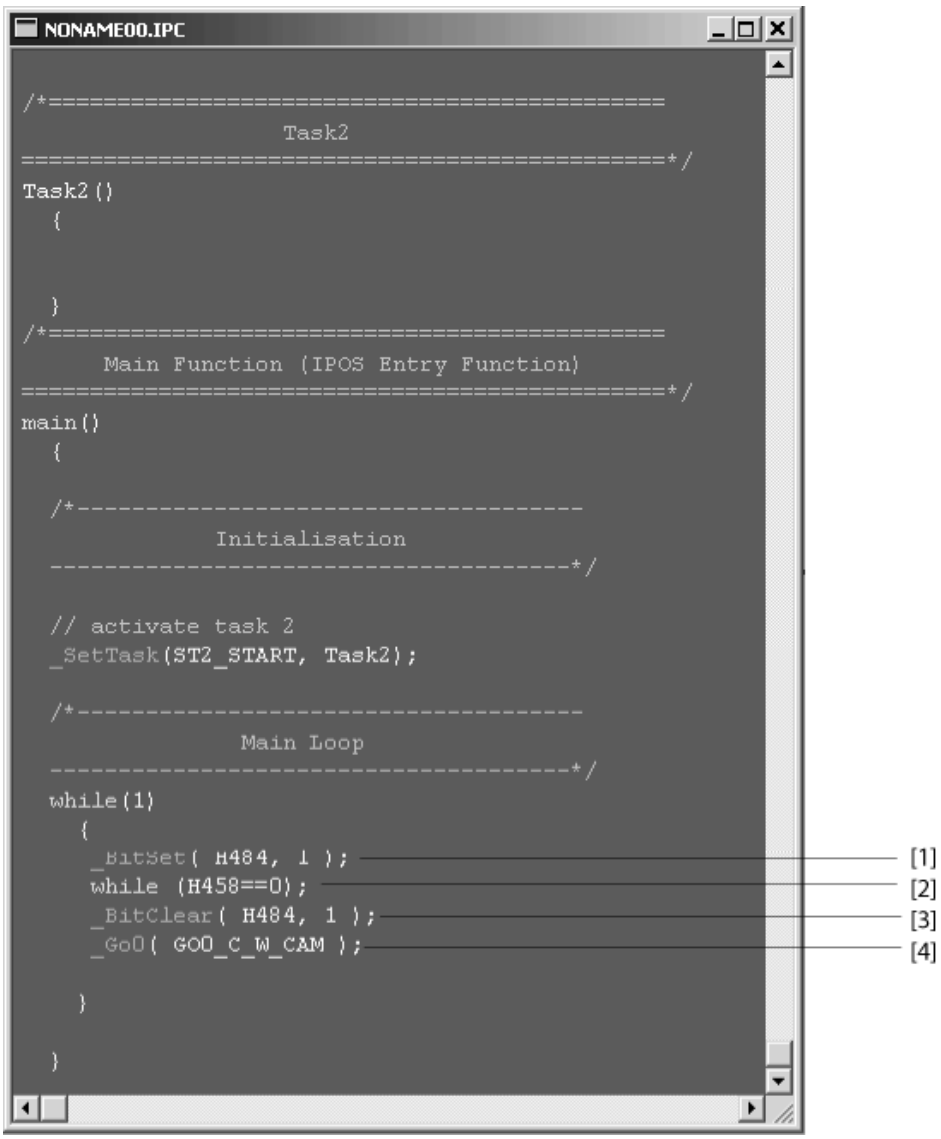


10530AEN

Figure 11: Screen in linear motor startup with internal conversion of linear values to rotary values

The values inFigure 10 are rounded off. You can calculate the exact rotary values for IPOS$^{plus®}$ from the linear values in the last screen of the V/X controller startup. In Figure 11 a set speed of 1500 rpm was calculated for IPOS$^{plus®}$ after the positioning velocity 1 m/s was entered.

IPOS$^{plus®}$ sample program for an incremental measuring system



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[1] Enable is reset

[2] Wait for commutation search to finish

[3] Enable is set

[4] Continue program as usual

Important notes

- In the case of absolute measuring systems, ensure that the drive can be moved without hindrance by the length of a pole pitch to the right during startup.
- In case of incremental measuring systems, ensure that the drive can be moved without hindrance by the length of a pole pitch to the right during startup.
- The commutation search is started automatically when "/CONTROLLER INHIBT=1." H458 is then set to "1" and the IPOS$^{plus®}$ program is executed.

7 Operation and Service

7.1 Malfunctions

The MOVIDRIVE MDX61B...-5_3-4-08 inverter displays malfunctions by means of a 7-segment display and a fault code. Refer to the MOVIDRIVE® MDX60B/61B operating instructions for information on how to repair the faults. The following notes offer additional information for troubleshooting especially for SL2 synchronous linear motors.

Faults may be hard to localize if the EMC wiring is not carried out correctly. These faults often cause problems in the inverter as the TF lines run in the motor cable. We recommend disconnecting the TF for test purposes and setting P835 to "No response" during commutation travel to exclude this error.

Motor monitoring is deactivated (P835 is set to "No response"): Make sure that there is no thermal overload in the SL2 linear motor! Otherwise the SL2 linear motor will suffer irreparable damage. Make sure you reconnect the TF monitoring after successful troubleshooting and set parameter P835 to "EMERGENCY STOP / FAULT".

7.2 Faults during commutation search

Fault	Possible cause	Remedy
Encoder error (14) when SL2 linear motor is moved manually	Encoder not installed correctly	Check installation using the encoder manufacturer information: 1. Air gap encoder - measuring tape 2. Alignment encoder - measuring tape 3. For HIPERFACE® encoder: Check mounting direction so that cable output shows in the direction of the smaller absolute values (direction "dot" on the measuring tape if available)
	Encoder not connected correctly	Check pin assignment, operate HIPERFACE® encoder as sin/cos encoder for test purposes
SL2 linear motor does not start after removal of CONTROLLER INHIBIT	Motor cable interrupted	Check linear motor connection
	Brake function P730 = ON	P730 must be set to "OFF" during the commutation search.
	Only for HIPERFACE® encoder: The inverter shows that the encoder has already been adjusted (H458=1)	If you want to perform commutation travel, select "Encoder adjustment" in the startup screen. In the case, the inverter will reset the bit automatically.
n-monitoring/ lag error during commutation travel	inverter is not assigned the status "NO ENABLE" because enable is set in addition to CONTROLLER INHIBIT or a terminal has been programmed to "ENABLE."	Assign binary input directly on unit via IPOSplus® control word or via fieldbus with ENABLE, e.g. P603 = ENABLE/ STOP.
	EMC problems	See the MOVIDRIVE® MDX60B/61B system manual and volume 9 of the Practical Drive Engineering series. Check for correct shielding, equipotential bonding and read the note at the beginning of this section.
Encoder error after commutation travel in positive direction (2nd movement)	Counting direction of the encoder does not correspond to U,V,W phase sequence of motor	Check whether the encoder counts positively in the direction that the primary was moving. If not, swap the U and W connections in the motor cables.
	Resolution of encoder system incorrect/Encoder defective	Slide the SL2 linear motor for a defined distance and check whether the displayed increments correspond to the calculated value using the calculation displayed by MOVITOOLS®. Adjust the encoder resolution in the linear motor startup, if necessary, and check the distance between scanner and measuring tape.
	Current limit reduced too far	Reset P303 to the value set by linear motor startup. Use parameter P304 to reduce the force.
Encoder error after commutation travel in negative direction (3rd movement)	Travel distances are not identical because axle is mechanically sluggish	Make sure that the drive travels with easy movement for the entire distance and no other forces are involved (process forces, weight forces).
	Travel distances are not identical because encoder is defective	Slide the SL2 linear motor for a defined distance and check whether the displayed increments correspond to the calculated value using the calculation displayed by MOVITOOLS®. Adjust the encoder resolution in the linear motor startup, if necessary, and check the distance between scanner and measuring tape.
	Current limit reduced too far	Reset P303 to the value set by linear motor startup. Use parameter P304 to reduce the force.
SL2 linear motor continues to rotate	EMC problems	See the MOVIDRIVE® MDX60B/61B system manual and volume 9 of the Practical Drive Engineering series. Check for correct shielding, equipotential bonding and read the note at the beginning of this section.
	Defective spot in linear scale	Slide the SL2 linear motor for a defined distance and check whether the displayed increments correspond to the calculated value using the calculation displayed by MOVITOOLS®. Perform the checks at several spots and check the distance between scanner and measuring tape.

7.3 Problems during operation

Fault	Possible cause	Remedy
SL2 linear motor does not start	Motor cable interrupted	Check the motor connection.
	Brake does not release	Check the brake control. Check the air supply for pneumatic brakes.
SL2 linear motor makes humming noise or does not run smoothly	Fault on encoder cable	See the MOVIDRIVE® MDX60B/61B system manual and volume 9 of the Practical Drive Engineering series. Check for correct shielding, equipotential bonding and read the note at the beginning of this section.
	Controller parameters set incorrectly	Start up the control loop again.
	Encoder connection with primary not rigid enough	Check to see if mechanical connection between encoder and primary is rigid enough.
	Permitted operating temperature of encoder exceeded	• Select the travel cycle so that the effective value of the output current is less than the rated current of the motor • Improve heat dissipation from the primary • Decouple encoder thermally (mounting with plastic distance plate) • Use an encoder system with a higher permitted operating temperature
SL2 linear motor heats up excessively	Overload	Select the travel cycle so that the effective value of the output current is less than the rated current of the motor.
	Insufficient cooling	Improve cooling or install fan
	Air gap too large, resulting in power loss at the same current (see derating table in catalog "SL2 Synchronous Linear Motors")	Adjust the air gap.
	Ambient temperature is too high	Select the travel cycle so that the effective value of the output current is less than the rated current of the SL2 linear motor.
HIPERFACE® encoder fault	Problems on encoder cable	If the problems do not occur during manual sliding, they are often caused by problems in the encoder or TF line. See the MOVIDRIVE® MDX60B/61B system manual and volume 9 of the Practical Drive Engineering series for information on troubleshooting. Check for correct shielding, equipotential bonding and read the note at the beginning of this section.
	Encoder not installed correctly	Check installation using the encoder manufacturer information: 1. Air gap encoder - measuring tape 2. Alignment encoder - measuring tape 3. For HIPERFACE® encoder: Check mounting direction so that cable output shows in direction smaller absolute values (direction "dot" on the measuring tape if present) Check rigidity of encoder mounting. Observe the manufacturer tolerances even with fast accelerations.

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Assembly **Sales** **Service**	**Moss**	SEW-EURODRIVE A/S Solgaard skog 71 N-1599 Moss	Tel. +47 69 241-020 Fax +47 69 241-040 sew@sew-eurodrive.no

Peru			
Assembly **Sales** **Service**	**Lima**	SEW DEL PERU MOTORES REDUCTORES S.A.C. Los Calderos, 120-124 Urbanizacion Industrial Vulcano, ATE, Lima	Tel. +51 1 3495280 Fax +51 1 3493002 sewperu@sew-eurodrive.com.pe

Poland			
Assembly **Sales** **Service**	**Lodz**	SEW-EURODRIVE Polska Sp.z.o.o. ul. Techniczna 5 PL-92-518 Lodz	Tel. +48 42 67710-90 Fax +48 42 67710-99 http://www.sew-eurodrive.pl sew@sew-eurodrive.pl

Portugal			
Assembly **Sales** **Service**	**Coimbra**	SEW-EURODRIVE, LDA. Apartado 15 P-3050-901 Mealhada	Tel. +351 231 20 9670 Fax +351 231 20 3685 http://www.sew-eurodrive.pt infosew@sew-eurodrive.pt

Romania			
Sales **Service**	**Bucuresti**	Sialco Trading SRL str. Madrid nr.4 011785 Bucuresti	Tel. +40 21 230-1328 Fax +40 21 230-7170 sialco@sialco.ro

Russia			
Assembly **Sales** **Service**	**St. Petersburg**	ZAO SEW-EURODRIVE P.O. Box 36 195220 St. Petersburg Russia	Tel. +7 812 3332522 +7 812 5357142 Fax +7 812 3332523 http://www.sew-eurodrive.ru sew@sew-eurodrive.ru

Senegal			
Sales	**Dakar**	SENEMECA Mécanique Générale Km 8, Route de Rufisque B.P. 3251, Dakar	Tel. +221 849 47-70 Fax +221 849 47-71 senemeca@sentoo.sn

Serbia and Montenegro			
Sales	**Beograd**	DIPAR d.o.o. Kajmakcalanska 54 SCG-11000 Beograd	Tel. +381 11 3088677 / +381 11 3088678 Fax +381 11 3809380 dipar@yubc.net

Singapore			
Assembly **Sales** **Service**	**Singapore**	SEW-EURODRIVE PTE. LTD. No 9, Tuas Drive 2 Jurong Industrial Estate Singapore 638644	Tel. +65 68621701 Fax +65 68612827 sewsingapore@sew-eurodrive.com

Slovakia			
Sales	**Sered**	SEW-Eurodrive SK s.r.o. Trnavska 920 SK-926 01 Sered	Tel. +421 31 7891311 Fax +421 31 7891312 sew@sew-eurodrive.sk

Slovenia			
Sales **Service**	**Celje**	Pakman - Pogonska Tehnika d.o.o. UI. XIV. divizije 14 SLO – 3000 Celje	Tel. +386 3 490 83-20 Fax +386 3 490 83-21 pakman@siol.net

South Africa			
Assembly **Sales** **Service**	**Johannesburg**	SEW-EURODRIVE (PROPRIETARY) LIMITED Eurodrive House Cnr. Adcock Ingram and Aerodrome Roads Aeroton Ext. 2 Johannesburg 2013 P.O.Box 90004 Bertsham 2013	Tel. +27 11 248-7000 Fax +27 11 494-3104 dross@sew.co.za
	Capetown	SEW-EURODRIVE (PROPRIETARY) LIMITED Rainbow Park Cnr. Racecourse & Omuramba Road Montague Gardens Cape Town P.O.Box 36556 Chempet 7442 Cape Town	Tel. +27 21 552-9820 Fax +27 21 552-9830 Telex 576 062 dswanepoel@sew.co.za
	Durban	SEW-EURODRIVE (PROPRIETARY) LIMITED 2 Monaceo Place Pinetown Durban P.O. Box 10433, Ashwood 3605	Tel. +27 31 700-3451 Fax +27 31 700-3847 dtait@sew.co.za

Spain			
Assembly **Sales** **Service**	**Bilbao**	SEW-EURODRIVE ESPAÑA, S.L. Parque Tecnológico, Edificio, 302 E-48170 Zamudio (Vizcaya)	Tel. +34 9 4431 84-70 Fax +34 9 4431 84-71 sew.spain@sew-eurodrive.es

Sweden			
Assembly **Sales** **Service**	**Jönköping**	SEW-EURODRIVE AB Gnejsvägen 6-8 S-55303 Jönköping Box 3100 S-55003 Jönköping	Tel. +46 36 3442-00 Fax +46 36 3442-80 http://www.sew-eurodrive.se info@sew-eurodrive.se

Switzerland			
Assembly **Sales** **Service**	**Basel**	Alfred Imhof A.G. Jurastrasse 10 CH-4142 Münchenstein bei Basel	Tel. +41 61 417 1717 Fax +41 61 417 1700 http://www.imhof-sew.ch info@imhof-sew.ch

Thailand			
Assembly **Sales** **Service**	**Chon Buri**	SEW-EURODRIVE (Thailand) Ltd. Bangpakong Industrial Park 2 700/456, Moo.7, Tambol Donhuaroh Muang District Chon Buri 20000	Tel. +66 38 454281 Fax +66 38 454288 sewthailand@sew-eurodrive.co.th

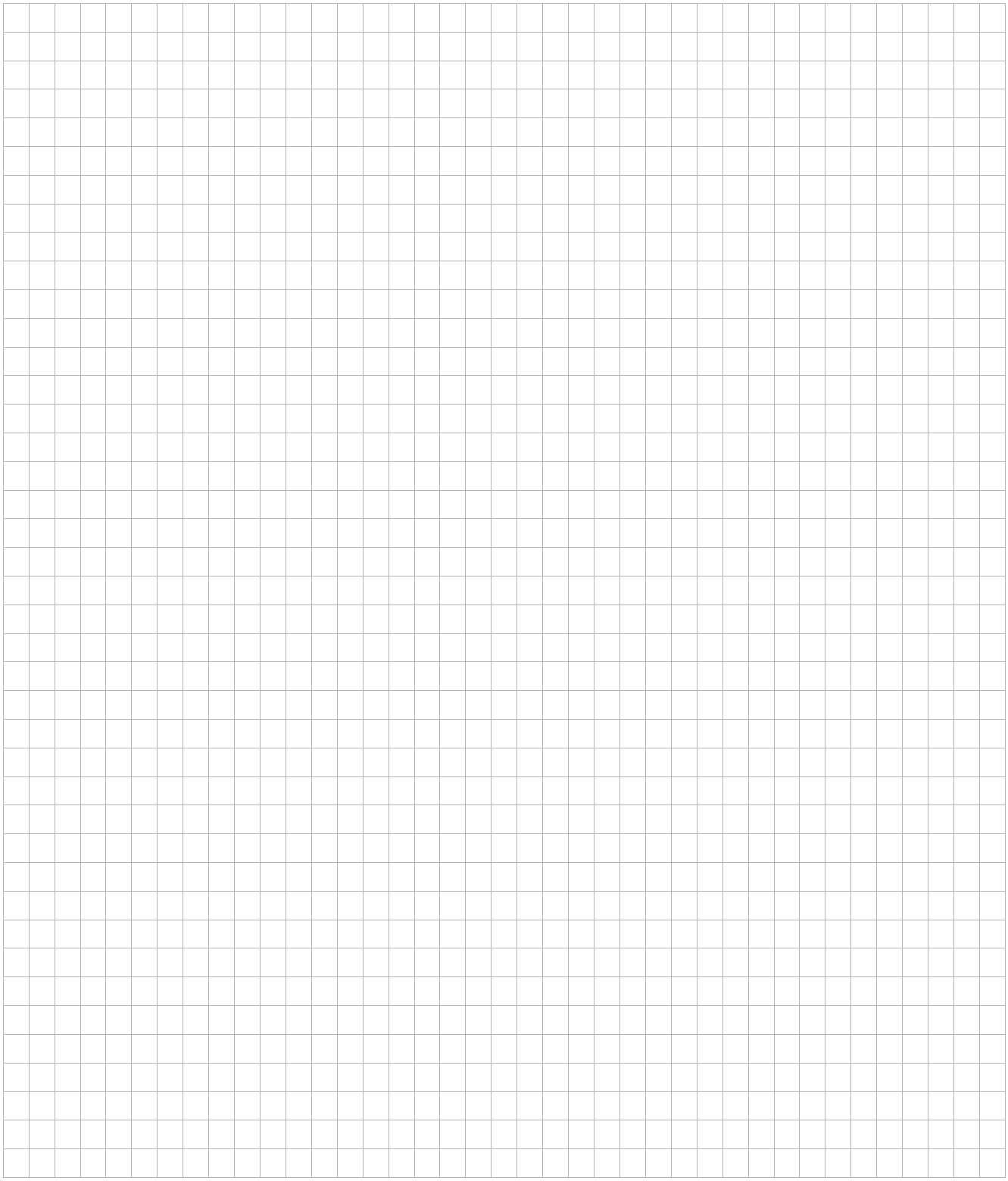
Tunisia			
Sales	**Tunis**	T. M.S. Technic Marketing Service 7, rue Ibn EI Heithem Z.I. SMMT 2014 Mégrine Erriadh	Tel. +216 1 4340-64 + 1 4320-29 Fax +216 1 4329-76

Turkey			
Assembly **Sales** **Service**	**Istanbul**	SEW-EURODRIVE Hareket Sistemleri Sirketi Bagdat Cad. Koruma Cikmazi No. 3 TR-34846 Maltepe ISTANBUL	Tel. +90 216 4419163 + 216 4419164 + 216 3838014 Fax +90 216 3055867 sew@sew-eurodrive.com.tr

Ukraine			
Sales **Service**	**Dnepropetrovsk**	SEW-EURODRIVE Str. Rabochaja 23-B, Office 409 49008 Dnepropetrovsk	Tel. +380 56 370 3211 Fax +380 56 372 2078 sew@sew-eurodrive.ua

USA			
Production **Assembly** **Sales** **Service**	**Greenville**	SEW-EURODRIVE INC. 1295 Old Spartanburg Highway P.O. Box 518 Lyman, S.C. 29365	Tel. +1 864 439-7537 Fax Sales +1 864 439-7830 Fax Manuf. +1 864 439-9948 Fax Ass. +1 864 439-0566 Telex 805 550 http://www.seweurodrive.com cslyman@seweurodrive.com
Assembly **Sales** **Service**	**San Francisco**	SEW-EURODRIVE INC. 30599 San Antonio St. Hayward, California 94544-7101	Tel. +1 510 487-3560 Fax +1 510 487-6381 cshayward@seweurodrive.com
	Philadelphia/PA	SEW-EURODRIVE INC. Pureland Ind. Complex 2107 High Hill Road, P.O. Box 481 Bridgeport, New Jersey 08014	Tel. +1 856 467-2277 Fax +1 856 845-3179 csbridgeport@seweurodrive.com
	Dayton	SEW-EURODRIVE INC. 2001 West Main Street Troy, Ohio 45373	Tel. +1 937 335-0036 Fax +1 937 440-3799 cstroy@seweurodrive.com
	Dallas	SEW-EURODRIVE INC. 3950 Platinum Way Dallas, Texas 75237	Tel. +1 214 330-4824 Fax +1 214 330-4724 csdallas@seweurodrive.com
	Additional addresses for service in the USA provided on request!		

Venezuela			
Assembly **Sales** **Service**	**Valencia**	SEW-EURODRIVE Venezuela S.A. Av. Norte Sur No. 3, Galpon 84-319 Zona Industrial Municipal Norte Valencia, Estado Carabobo	Tel. +58 241 832-9804 Fax +58 241 838-6275 sewventas@cantv.net sewfinanzas@cantv.net



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With people who think fast and develop the future with you.

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With comprehensive knowledge in virtually every branch of industry today.

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